FAP 2292

Gabarito – Lista de Exercícios 6
Leis da Indução

Exercícios Sugeridos (29/04/2010) — A numeração corresponde ao Livros Textos A e B.

A23.1 $I = 0{,}800$ mA.

A23.4 a) $I = \frac{1}{R}\left(\frac{1}{2}\mu_0 n \frac{\Delta I}{\Delta t}\right)\pi r_2^2$; $B = \frac{\mu_0 i}{2r_1}$ (axial, para cima se $\Delta I/\Delta t > 0$).

A23.8 (a) $\mathcal{M} = \mu_0 n N \pi r_s^2 = 23{,}7\ \mu$H; $\mathcal{E}(t) = \mathcal{M}\frac{\mathrm{d}I_s}{\mathrm{d}t} = \mathcal{E}_0\cos(\omega t)$, $\mathcal{E}_0 = \mathcal{M}\omega I_0 = 44{,}6$ mV.

A23.18 $\mathcal{E} = \frac{1}{2}\omega B R^2 = 24{,}1$ V.

A23.20 $\mathcal{E} = \mathcal{E}_0\cos\omega t; \mathcal{E}_0 = N\omega\pi r^2 B_0 = N\omega\pi r^2\mu_0 n I = 28{,}6$ mV.

A23.56 (b) $L = 91{,}2\ \mu$H; (c) $L \approx 90{,}9\ \mu$H, $0{,}27\%$ menor.

P2.4 Dentro do toróide ($R - a/2 < r < R + a/2$, $-a/2 < z < +a/2$):
$\mathbf{H} = \frac{NI}{2\pi r}\hat{\phi}$, $\mathbf{B} = \mu\mathbf{H}$, $\mathbf{M} = (\kappa_m - 1)\mathbf{H}$.
Fora do toróide os três campos são nulos.
$U = \frac{\mu N^2 a}{4\pi}\ln\left(\frac{R + a/2}{R_a/2}\right) I^2$.

B29.7 a) $B = \frac{\mu_0 i}{2\pi r}$, para dentro da figura.
b) $\mathrm{d}\Phi_B = B(r)L\mathrm{d}r = \frac{\mu_0 i}{2\pi}L\frac{\mathrm{d}r}{r}$. c) $\Phi_B = \frac{\mu_0 i}{2\pi}L\ln(b/a)$.
d) $\mathcal{E} = -\frac{\mathrm{d}\Phi_B}{\mathrm{d}t} = -\frac{\mu_0}{2\pi}L\ln(b/a)\frac{\mathrm{d}i}{\mathrm{d}t}$. e) $\mathcal{E} = 5{,}06\times10^{-7}$ V (sentido anti-horário).

B29.25 a) $\mathcal{E} = vBL = 3{,}00$ V. b) de b para a.
c) $F = iBL = vB^2L^2/R = 0{,}800$ N. d) $vF = (vBL)^2/R = i^2R$.

B29.30 a) Circunferências - sentido horário.
b) $\mathcal{E}\oint = \mathbf{E}\cdot\mathrm{d}\vec{s} = 2\pi r E(r) = -\frac{\mathrm{d}\Phi_B}{\mathrm{d}t} = \pi r^2\frac{\mathrm{d}B}{\mathrm{d}t} \Rightarrow E(r) = \frac{r}{2}\frac{\mathrm{d}B}{\mathrm{d}t}$.
c) $i = \mathcal{E}/R = \frac{\pi r^2}{R}\frac{\mathrm{d}B}{\mathrm{d}t} = 0{,}275$ mA. d) $\mathcal{E}_{ab} = \frac{1}{2}\mathcal{E} = 0{,}550$ mV. d) $\mathcal{E} = 1{,}100$ mV.

B29.68 $V_{12} = \mathcal{E}_{12} = \int_1^2 \mathbf{v}\times\mathbf{B}\cdot\mathrm{d}\vec{s}. = \int_1^2 \omega r B\mathrm{d}r = \frac{1}{2}\omega B\left(r_2^2 - r_1^2\right)$
a) $V = \frac{1}{8}\omega B L^2$. b) $V = 0$. c) $V = 0{,}576$ mV.

B29.77 a) de a para b. b) $iBL\cos\phi = mg\,\mathrm{sen}\,\phi$, $i = \frac{\mathcal{E}}{R} = \frac{vB\cos\phi L}{R} \Rightarrow v = \frac{Rmg\,\mathrm{sen}\,\phi}{B^2L^2\cos^2\phi}$.
c) $P_R = Ri^2 = R\left(\frac{mg\,\mathrm{sen}\,\phi}{BL\cos\phi}\right)^2$; d) $P_g = (mg\,\mathrm{sen}\,\phi)v = R\left(\frac{mg\,\mathrm{sen}\,\phi}{BL\cos\phi}\right)^2 = P_R$.